

WHAT IS CLAIMED IS:

1. A reflection screen apparatus in which a projection apparatus projects an image based on received image data and an observer observes the image,  
5 comprising:

a screen reflection surface which visibly diffuses and reflects the image projected by the projection apparatus to the observer; and

a light distribution correction section configured  
10 to change a state of a distribution direction of a light reflected on the screen reflection surface so as to more reflect a diffused light reflected on the screen reflection surface to the observer.

2. The apparatus according to claim 1, further  
15 comprising a projected luminous flux incident angle detection section configured to detect an angle of the projected light of the projection apparatus made incident on the screen reflection surface, wherein

the light distribution correction section changes  
20 the state of the distribution direction of the light reflected on the screen reflection surface based on the angle detected by the projected luminous flux incident angle detection section.

3. The apparatus according to claim 2, further  
25 comprising a screen light distribution angle storage section configured to store a light distribution angle of the light reflected on the screen reflection

surface, wherein

the light distribution correction section changes the state of the distribution direction of the light reflected on the screen reflection surface based on the angle detected by the projected luminous flux incident angle detection section and the light distribution angle stored by the screen light distribution angle storage section.

4. The apparatus according to claim 2, wherein the projected luminous flux incident angle detection section includes:

a condenser lens arranged on a front side of the screen reflection surface; and

one of a light spot position detection sensor and a light amount detection sensor, configured to detect a light condensed by the condenser lens, and the projected luminous flux incident angle detection section detects the angle of the light made incident on the screen reflection surface based on one of a light spot position detected by the light spot position detection sensor and an amount of a light detected by the light amount detection sensor.

5. The apparatus according to claim 1, wherein the screen reflection surface has a predetermined reflected light distribution angle, and

the light distribution correction section changes the state of the distribution direction of the light

reflected on the screen reflection surface by deforming the screen reflection surface to be a concave surface shape seen from the observer.

5       6. The apparatus according to claim 5, wherein the light distribution correction section

includes deformation wires roughly arranged on both ends of the screen reflection surface, and

deforms the screen reflection surface to be the concave surface shape along the deformation wires.

10       7. The apparatus according to claim 1, wherein the light distribution correction section includes:

a deformation pattern storage section configured to store a plurality of kinds of deformation shape patterns of the screen reflection surface; and

15       a deformation pattern selection section configured to cause the observer to select one of the deformation shape patterns stored by the deformation pattern storage section, and

20       the light distribution correction section deforms a shape of the screen reflection surface based on the deformation shape pattern selected by the deformation pattern selection section.

25       8. The apparatus according to claim 1, further comprising:

an observer covering area setting section configured to set an observer covering area that is

information of a position in which the observer is present; and

5 a screen light distribution angle storage section configured to store the light distribution angle of the light reflected on the screen reflection surface, wherein

the light distribution correction section includes:

10 a screen deformation amount calculation section configured to calculate an optimal deformation amount of the screen reflection surface based on the incident angle of the light on the screen reflection surface detected by the projected luminous flux incident angle detection section, the observer covering area set by the observer covering area setting section, 15 and the light distribution angle stored by the screen light distribution angle storage section;

a deformation amount display section configured to display the optimal deformation amount calculated by the screen deformation amount calculation section; 20

a deformation pattern storage section configured to store the deformation shape patterns of the screen reflection surface; and

25 a deformation pattern selection section configured to cause the observer to select one of the deformation shape patterns stored by the deformation

pattern storage section based on the optimal deformation amount displayed by the deformation amount display section, and

5 the light distribution correction section changes the shape of the screen reflection surface based on the deformation shape pattern selected by the deformation pattern selection section.

9. The apparatus according to claim 1, further comprising a photoelectric conversion section  
10 configured to convert a light projected on the screen reflection surface into power, and supply the power to the light distribution correction section, wherein

the light distribution correction section changes the state of the light distribution direction on the  
15 screen reflection surface by using the power supplied from the photoelectric conversion section.

10. The apparatus according to claim 1, further comprising an observer covering area setting section configured to set an observer covering area that is  
20 information of a position in which the observer is present, wherein

the light distribution correction section changes the state of the light distribution direction on the screen reflection surface based on the observer  
25 covering area set by the observer covering area setting section.

11. The apparatus according to claim 10, wherein

the observer covering area setting section includes:

at least one marker which emits a light to at least the screen reflection surface; and

5 a marker light spot position detection sensor configured to receive the light emitted from the marker to obtain a coordinate position of the marker relative to the screen reflection surface, and

the observer covering area setting section sets  
10 the observer covering area based on the coordinate position obtained by the marker light spot position detection sensor.

12. The apparatus according to claim 11, wherein the observer covering area setting section sets a space  
15 surrounded with a plurality of marker coordinates obtained by the marker light spot position detection sensor as the observer covering area.

13. The apparatus according to claim 11, wherein the observer covering area setting section sets a space  
20 that has a predetermined spatial spread including the marker coordinate obtained by the marker light spot position detection sensor as the observer covering area.

14. The apparatus according to claim 1, wherein  
25 the light distribution correction section

includes at least one photodetection sensor configured to receive the light reflected on the screen

reflection surface to detect an amount thereof, and  
changes the state of the light distribution  
direction on the screen reflection surface in such a  
way that a total amount of the light detected by the  
photodetection sensor becomes maximum.

15. The apparatus according to claim 1, wherein  
the light distribution correction section

includes a plurality of photodetection sensors  
configured to receive the light reflected on the screen  
reflection surface to detect an amount thereof, and  
changes the state of the light distribution  
direction on the screen reflection surface in such a  
way that a difference in amounts of lights detected by  
the plurality of photodetection sensors becomes  
minimum.

16. The apparatus according to claim 1, wherein  
a plurality of movable micro-diffusion reflection  
surfaces are disposed on the screen reflection surface,  
and

the light distribution correction section changes  
the state of the direction of the light reflected on  
the screen reflection surface by moving the micro-  
diffusion reflection surfaces.

17. The apparatus according to claim 16, wherein  
the micro-diffusion reflection surfaces hold  
deformation by electrostatic forces.

18. A projection system comprising:

a projection apparatus which projects an image based on received image data;

a reflection screen apparatus in which an observer observes the image, the reflection screen apparatus including:

a screen reflection surface which visibly diffuses and reflects the image projected by the projection apparatus to the observer; and

a light distribution correction section configured to change a state of a distribution direction of a light reflected on the screen reflection surface so as to more reflect a diffused light reflected on the screen reflection surface to the observer, the light distribution correction section changing the state of the light distribution direction and outputting image correction information in accordance with an amount of the change; and

an image correction section configured to execute image correction for the image data sent to the projection apparatus based on the image correction information from the light distribution correction section.

19. The system according to claim 18, wherein the image correction executed by the image correction section is distortion correction of an image.

20. The system according to claim 18, wherein the image correction executed by the image correction

section is nonuniform luminance correction of an image.

21. A reflection screen apparatus in which a  
projection apparatus projects an image based on  
received image data and an observer observes the image,  
5 comprising:

a screen reflection surface which visibly diffuses  
and reflects the image projected by the projection  
apparatus to the observer; and

light distribution correction means for changing a  
10 state of a distribution direction of a light reflected  
on the screen reflection surface so as to more reflect  
a diffused light reflected on the screen reflection  
surface to the observer.

22. A projection system comprising:

15 a projection apparatus which projects an image  
based on received image data;

a reflection screen apparatus in which an observer  
observes the image, the reflection screen apparatus  
including:

20 a screen reflection surface which visibly  
diffuses and reflects the image projected by the  
projection apparatus to the observer; and

light distribution correction means for  
changing a state of a distribution direction of a light  
25 reflected on the screen reflection surface so as to  
more reflect a diffused light reflected on the screen  
reflection surface to the observer, the light

distribution correction means changing the state of the light distribution direction and outputting image correction information in accordance with an amount of the change; and

- 5           image correction means for executing image correction for the image data sent to the projection apparatus based on the image correction information from the light distribution correction means.